DEFENSE INFORMATION SYSTEMS AGENCY
JOINT INTEROPERABILITY TEST COMMAND
FORT HUACHUCA, ARIZONA 85613-7020

Networks, Transmission and
   Intelligence Division (JTE)

MEMORANDUM FOR DISTRIBUTION

SUBJECT: Joint Interoperability Test Certification of
                  Nortel Networks' Broadband Signaling Transfer
                  Point (STP), Software Version 3.0.3.18d, and
                  Tekelec Eagle Signaling Transfer Point (STP)
                  Systems, Software Release 23.1

Reference: (a) DoD Directive 4630.5, "Compatibility,
                       Interoperability, and Integration of
                       Command, Control, Communications, and
                       Intelligence (C3I) Systems," 12 Nov 92.

                  (b) CJCSI 6212.01A, "Compatibility,
                       Interoperability, and Integration of
                       Command, Control, Communications, Computers,
                       and Intelligence Systems," 30 Jun 95.

1.   References (a) and (b) establish the Defense Information
Systems Agency (DISA), Joint Interoperability Test Command
(JITC), as the responsible organization for interoperability
test certification. Additional references are provided in
Enclosure 1.

2.   The Nortel Networks' BroadBand STP system with Nortel
Software Version 3.0.3.18d and the Tekelec Eagle STP system with
Eagle Software Revision 23.1 met the interoperability
requirements critical for deployment in Defense Information
Systems Network Europe and Pacific, and are certified for the
specific interfaces provided in Table 1. The STPs also meet the
interface requirements for Signaling System 7 (SS7) A-link, B-
link, and C-links per References (c) and (d).

Table 1. Nortel Networks' Broadband STP and Tekelec Eagle STP Interface Interoperability Status

DISN Interoperability/ Interface Requirement	Critical	Status	Remarks
Nortel Networks' MSL-100 SPCS Siemens EWSD SPCS Lucent 5ESS SPCS Nortel Networks' Broadband STP Tekelec Eagle STP Promina 400 Channel Bank Premisys IMACS/800 Access-T 1500 CSU/DSU	Yes	Certified	All interoperability and interface requirements met.
SS7 Signaling Link Connectivity	Yes	Certified	A, B, and C-link connectivity tested.
SS7 Signaling Link Interfaces	Yes	Certified	V.35, DS-1 and OCU-DP Interfaces tested.

Table 2. JEIO Technical Report 8249 Generic Switching Center Requirements (GSCR) for DISN SS7 Networks.

Conformance Requirement	Critical	Status	Remarks
SS7 Network Structure	Yes	Passed	GSCR Para. 6.5.1
Signaling Link Characteristics	Yes	Passed	GSCR Para. 6.5.2
Signaling Message Handling, Formats, and Codes	Yes	Passed	GSCR Para. 6.5.1, 6.5.3-5, 6.5.10-11.
Signaling Network Management	Yes	Passed	GSCR Para. 6.5.4
Error Detection and Recovery	Yes	Passed	GSCR Para. 6.5.4.2
Signaling Link Congestion	No	Not tested.	Test equipment not available.

3.   The Nortel Networks' Broadband STPs are certified for the V.35 interface and the Tekelec E

agle STPs are certified for the V.35 and OCU-DP interfaces. Reference (c) requires at least one of the following SS7 signaling data link interfaces: V.35, DS0A, OCU-DP, DS-CS, or DS1. Conformance tests were also conducted as part of the interoperability certification process to verify compliance with applicable SS7 requirements and standards. The STPs were evaluated for conformance with the standards specified in References (c) and (d). A listing of the standards and requirements critical to STP and Stored Program Control Switches (SPCS) deployment in the Defense Information Systems Network Europe and Pacific is provided in Table 2.

4.   These certifications are based on interoperability and conformance testing conducted at the JITC Network Engineering and Integration Lab (NEIL), Fort Huachuca, AZ. Initial testing of the Tekelec Eagle STPs was conducted January through March 2000. The Nortel Networks' Broadband STP testing was conducted during July and August 2001 and combined testing of both STP occurred in October and November 2001. Testing of the STP systems was carried out in accordance with Reference (e) and is summarized in Enclosure 2.

5.   JITC disseminates certification testing information to the DOD community via the Joint Interoperability Tool (JIT), which resides on the SIPRNET at http://199.208.204.125/jitc.htm or at http://198.17.54.202/jitc.htm, and on the NIPRNET at http://jit.fhu.disa.mil/. A copy of this certification memorandum and enclosures will be available on the JIT. Instructions for obtaining access to JIT information are contained on the above homepages. This certification expires upon system changes that affect interoperability, but no later than three years from the date of this memorandum.

6. The JITC point of contact is Captain Gordon Bradley, DSN 821-8575 or commercial (520) 533-8575. The e-mail address is bradleyg@fhu.disa.mil.

FOR THE COMMANDER:

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Additional References

(c) Bellcore GR-82-CORE, Signal Transfer Point Generic Requirement, 1996.

(d) Defense Information Systems Agency (DISA), Joint Interoperability and Engineering Organization (JIEO), Technical Report 8249, "Defense Information Systems Network (DISN) Circuit Switched Subsystem, Defense Switched Network (DSN) Generic Switching Center Requirements (GSCR)," March 1997

(e) Joint Interoperability Test Command, "Signaling System 7 Signaling Transfer Point Test Plan," July 2001.

CERTIFICATION TESTING SUMMARY

1.   SYSTEM TITLE. Nortel Networks' BroadBand Signaling Transfer Point System, Software Release 3.0.3.18d and Tekelec Eagle Signaling Transfer Point System, Software Revision 23.1.

2.   PROPONENT. Defense Information Systems Agency (DISA).

3.   PROGRAM MANAGER. Howard Osman, NS53, 114 Isaac Newton Square, Reston, VA 22090-5087, DSN 653-8075, E-mail: osmanH@ncr.disa.mil.

4.   TESTERS. DISA(NS581), and Joint Interoperability Test Command, Ft. Huachuca, AZ.

5.   SYSTEM UNDER TEST DESCRIPTION. STPs are employed in the Defense Information Systems Network (DISN) and the Public Switched Telephone Network (PSTN) to route signaling messages between Stored Program Control Switches (SPCSs).   The Nortel Networks' BroadBand (BB) STP and Tekelec Eagle STP are standalone STPs capable of routing call setup, call control, network management, user-to-network, and user-to-user signaling messages throughout SS7 networks.   Both STP systems also support a broad range of Intelligent Network services such as Local Number Portability and Calling Name Delivery. Tekelec Eagle STPs are currently used in the DISN-Pacific and Nortel Networks' BB STPs will be deployed by DISA in DISN-E. JITC performed interoperability tests on both STP systems in a simulated DSN environment.

6.   OPERATIONAL ARCHITECTURE. The STP systems were tested at the JITC Network Engineering and Integration Lab (NEIL) in a manner and configuration similar to that of the DISN-E and DISN-Pacific operational environments depicted in Figure 1. Tekelec Eagle STPs are currently deployed in Japan, Korea, Hawaii and Alaska and Nortel Networks' BroadBand STPs are scheduled for deployment at the DISN-E locations shown in Figure 1.

7.   REQUIRED SYSTEM INTERFACES. Table 1 details the interfaces required for interoperability certification of the STPs with the Nortel Networks' MSL-100, Siemens EWSD, and Lucent 5ESS SPCS. Promina 400/800, Premisys IMACS/800 Channel Bank and Access-T 1500 DSC/CSUs are also included to combine the individual 56 kbps data links required by the STPs into the DS1 format accepted by the SPCSs. The A-link, B-link, and C-link interfaces provide basic SS7 connectivity with SPCSs and other STPs. Section 6.5 of Reference (c) requires at least one of the following data link interfaces to be supported: V.35, OCU-DP (DS-CS), DS1, or DSOA. The V.35 interface was tested because it is planned for deployment in DISN-E and DISN-Pacific   The DS1 interface was tested because it is only interface supported by the DSN SPCSs. The Tekelec Eagle STPs are also capable of supporting OCU-DP, and DSOA interfaces in addition to V.35. The Nortel Networks' BB STP also supports the DSOA interface in addition to V.35.
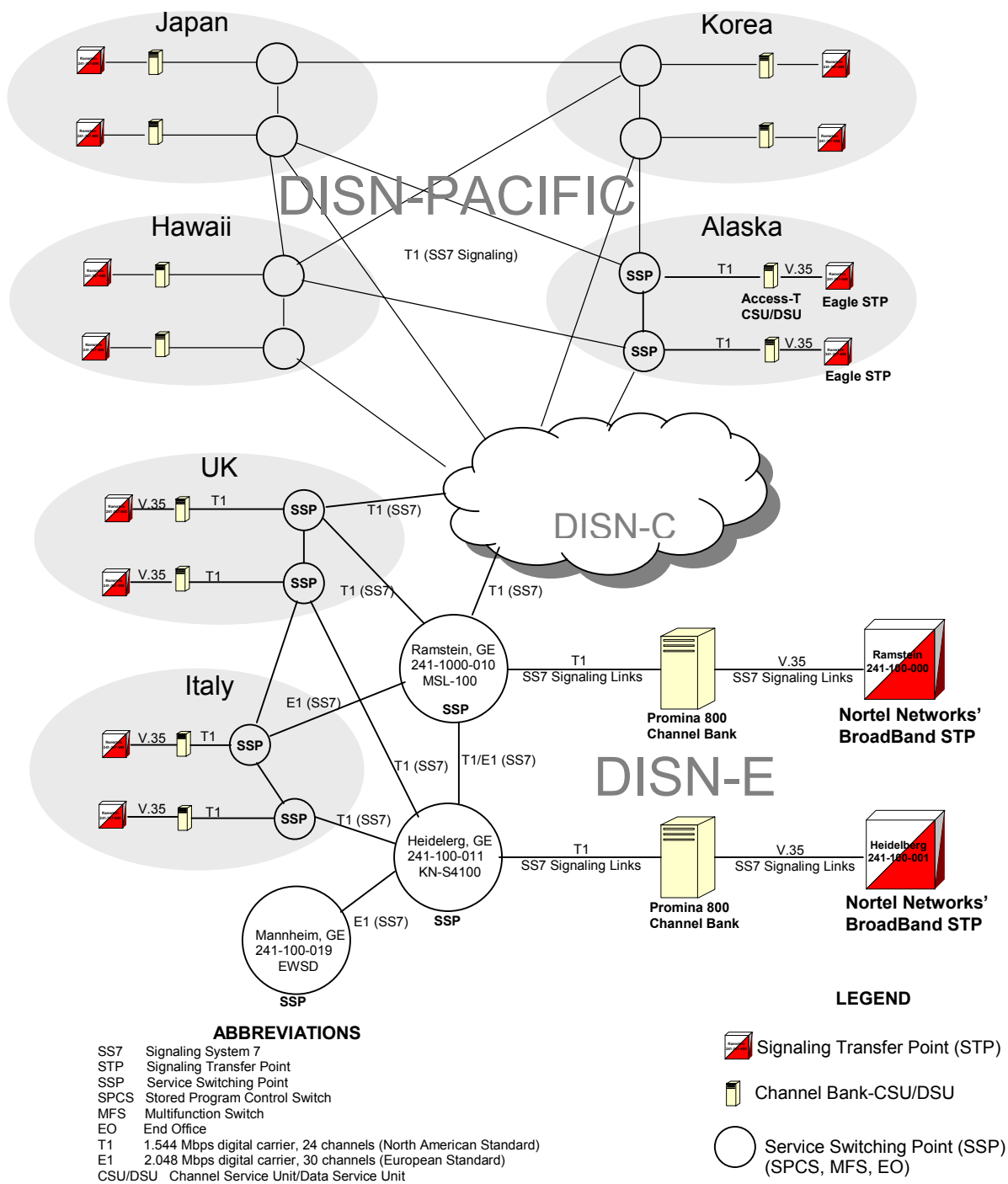
Japan

Korea

DISN-PACIFIC

T1 (SS7 Signaling)

Hawaii

Alaska

SSP — T1 — V.35
Access-T
CSU/DSU — **Eagle STP**

SSP — T1 — V.35 — **Eagle STP**

DISN-C

UK

V.35 — T1 — **SSP** — T1 (SS7)

V.35 — T1 — **SSP** — T1 (SS7)

T1 (SS7)

Italy

Ramstein, GE
241-1000-010
MSL-100
SSP

E1 (SS7)

T1
SS7 Signaling Links

**Promina 800
Channel Bank**

V.35
SS7 Signaling Links

**Ramstein
241-100-000**

**Nortel Networks'
BroadBand STP**

V.35 — T1 — **SSP**

T1 (SS7)   T1/E1 (SS7)

DISN-E

V.35 — T1 — **SSP** — T1 (SS7)

Heidelerg, GE
241-100-011
KN-S4100
SSP

T1
SS7 Signaling Links

**Promina 800
Channel Bank**

V.35
SS7 Signaling Links

**Heidelberg
241-100-001**

**Nortel Networks'
BroadBand STP**

Mannheim, GE
241-100-019
EWSD
SSP

E1 (SS7)

LEGEND

Signaling Transfer Point (STP)

Channel Bank-CSU/DSU

Service Switching Point (SSP)
(SPCS, MFS, EO)

ABBREVIATIONS

SS7   Signaling System 7
STP   Signaling Transfer Point
SSP   Service Switching Point
SPCS   Stored Program Control Switch
MFS   Multifunction Switch
EO   End Office
T1   1.544 Mbps digital carrier, 24 channels (North American Standard)
E1   2.048 Mbps digital carrier, 30 channels (European Standard)
CSU/DSU   Channel Service Unit/Data Service Unit

Figure 1. DISN SS7 Operational Architecture

Table 1. Required Interfaces

Interface Requirement	Critical	GSCR References
DISN Interoperability		
Nortel Networks' MSL-100 SPCS Siemens EWSD SPCS Lucent 5ESS SPCS	Yes	Common Channel Signaling Number 7 (SS7) in accordance with GSCR Para. 6.5
Nortel Networks' BroadBand STP Tekelec Eagle STP	Yes	SS7 in accordance with GSCR Para. 6.5 and B-link connectivity in accordance with Para. 6.5.1.2.1.b
Promina 400/800 Access-T 1500 DSU/CSU Premisys IMACS/800	Yes	56/64 Kbps Data Link Transmission paths in accordance with GSCR Para. 6.5.2 and Bellcore LSSGR Section 6.5.2
SS7 Signaling Link Connectivity Requirements		
A-Links B-Links C-Links	Yes	CCS7 (SS7) Signaling Link Connectivity in accordance with GSCR Para. 6.5.1.2.1
SS7 Signaling Link Interfaces		
V.35 DS-1	Yes	Signaling Data Link Physical Interface in accordance with GSCR Para. 6.5.2 and Bellcore LSSGR Section 6.5.2.1
DS0A OCU-DP	No	

8.   TEST NETWORK DESCRIPTION. The test network configuration depicted in Figure 2 accurately emulates the DISN SS7 operational environment. The STPs were configured as mated pairs and connected to the MSL-100, EWSD, and 5ESS SPCSs via Promina 400 and Premisys Channel Banks. The Promina 400 Channel Bank was used to convert the 56Kbps, V.35 SS7 links, provided by the Nortel Networks' Broadband STPs, into the DS1 format for the SPCSs. The Premisys Channel Bank was used to convert the OCU-DP links provided by Tekelec Eagle STPs to DS1. The Tekelec Eagle STP signaling links were initially configured and tested using the V.35 interface. However, they were changed to the OCU-DP interface when the BroadBand STPs were added to the test network because of limitations on the number of V.35 terminations available in the NEIL. The BroadBand and Eagle STP pairs were also interconnected via B-links through the Promina 400 and Premisys Channel Banks as illustrated in Figure 2.

9.   SYSTEM CONFIGURATIONS. Table 2 lists the hardware and software configurations associated with the systems used during the test.

Table 2. Tested System Configuration

System Name	Hardware	Software
Nortel Networks' BroadBand STP	Signaling Server Platform	Version 3.0.3.18d
Tekelec Eagle STP	Eagle Data Packet Switch	Release 23.1
Nortel Networks' MSL-100 SPCS	RISC Processor	MSL-15
Siemens EWSD SPCS	CP 113C	Version 18
Lucent 5ESS SPCS	5ESS	5E15
Prominia 400		
Premisys IMACS/800 Channel Bank		Release 3.8.0
Access-T 1500 DSU/CSU		087-161E-03C/087-062E-01C

10. TESTING LIMITATIONS.   All interfaces required for initial deployment of the Nortel Networks' BroadBand and Tekelec Eagle STPs were successfully tested in an operationally realistic environment, however, JITC was unable to generate enough voice and signaling traffic to demonstrate compliance with the signaling link congestion control requirements specified in Reference (c). This limitation is not important to STP deployment and will have no negative operational impact in DISN-E or DISN-Pacific

because anticipated traffic loads are much less than the levels required to congest the signaling links.
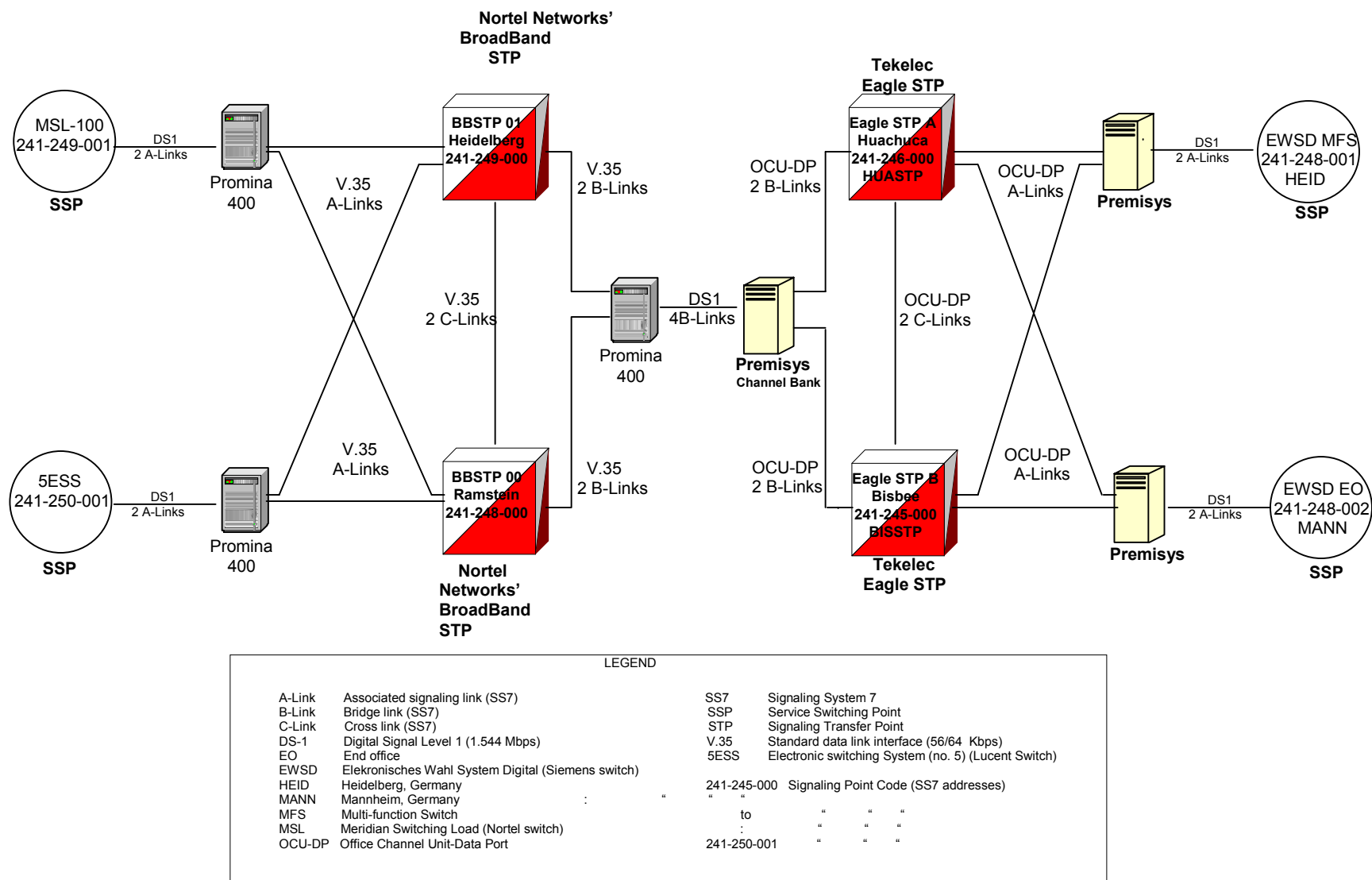
Figure 2. Test Network Configuration

Diagram labels:

Nortel Networks' BroadBand STP

Tekelec Eagle STP

MSL-100
241-249-001
SSP

DS1
2 A-Links

Promina 400

V.35 A-Links

BBSTP 01
Heidelberg
241-249-000

V.35
2 B-Links

OCU-DP
2 B-Links

Eagle STP A
Huachuca
241-246-000
HUASTP

OCU-DP
A-Links

Premisys

DS1
2 A-Links

EWSD MFS
241-248-001
HEID
SSP

V.35
2 C-Links

V.35 A-Links

Promina 400

DS1
4B-Links

Premisys
Channel Bank

OCU-DP
2 C-Links

5ESS
241-250-001
SSP

DS1
2 A-Links

Promina 400

BBSTP 00
Ramstein
241-248-000

V.35
2 B-Links

OCU-DP
2 B-Links

Eagle STP B
Bisbee
241-245-000
BISSTP

OCU-DP
A-Links

Premisys

DS1
2 A-Links

EWSD EO
241-248-002
MANN
SSP

Nortel Networks' BroadBand STP

Tekelec Eagle STP

LEGEND

A-Link	Associated signaling link (SS7)	SS7	Signaling System 7
B-Link	Bridge link (SS7)	SSP	Service Switching Point
C-Link	Cross link (SS7)	STP	Signaling Transfer Point
DS-1	Digital Signal Level 1 (1.544 Mbps)	V.35	Standard data link interface (56/64 Kbps)
EO	End office	5ESS	Electronic switching System (no. 5) (Lucent Switch)
EWSD	Elekronisches Wahl System Digital (Siemens switch)		
HEID	Heidelberg, Germany	241-245-000	Signaling Point Code (SS7 addresses)
MANN	Mannheim, Germany	: " " "
MFS	Multi-function Switch	to " " "
MSL	Meridian Switching Load (Nortel switch)	:
OCU-DP	Office Channel Unit-Data Port	241-250-001 " " "

11. ASSESSMENT RESULTS

a. **Interoperability Results.** Table 3 shows the interoperability status for the required interfaces.

(1) Interoperability between the Nortel Networks' BroadBand STP system and the Nortel Networks' MSL-100, Siemens EWSD, and Lucent 5ESS SPCSs was successfully tested and certified. SS7 call setup and control messages were routed to the correct destinations by the STPs and inter-switch calls were completed successfully. Signaling link management functions such as initial alignment, change-over, change-back, and emergency alignment were executed properly by the STPs and SPCSs. SS7 Signaling Link interfaces (A-links and C-links) were also certified as part of these tests.

(2) Interoperability between the Tekelec Eagle STP system and the Nortel Networks' MSL-100, Siemens EWSD, and Lucent 5ESS SPCSs was successfully tested and certified. SS7 call setup and control messages were routed to the correct destinations by the STPs and inter-switch calls were completed successfully. Signaling link management functions such as initial alignment, change-over, change-back, and emergency alignment were executed properly by the STPs and SPCSs. SS7 Signaling Link interfaces (A-links B-links and C-links) were also certified as part of these tests.

(3) Interoperability between the Nortel Networks' BroadBand STP system and the Tekelec Eagle STP system was also successfully tested and certified. SS7 call setup, control, and signaling network management messages were routed via B-links from STP to STP to the correct destinations. Both STP systems performed signaling network management functions in accordance with requirements specified in References c and d.

(4) The Promina 400 is certified for interoperability with the Nortel Networks' BroadBand STPs and MSL-100 SPCS, Siemens EWSD SPCS, and Lucent 5ESS SPCS. The V.35 signaling data link required by the BroadBand STP and DS1 interface accepted by the SPCSs were also certified as part of these tests.

(5) The Premisys IMACS/800 Channel Bank is certified for interoperability with the Tekelec Eagle STPs and MSL-100 SPCS, Siemens EWSD SPCS, and Lucent 5ESS SPCS. The OCU-DP signaling data link accepted by the Tekelec Eagle STPs was also certified as part of these tests.

(6) The Access T-1500 CSU/DSU is certified for interoperability with the Tekelec Eagle STPs and MSL-100 SPCS and Siemens EWSD SPCS. The V.35 signaling data link accepted by the Tekelec Eagle STPs was also certified as part of these tests.

(7)　　　The 64 kbps DS0A signaling data link interface was not tested because of equipment limitations.

b.　Conformance Results.　The results of STP testing for conformance with the SS7 requirements specified in References (c and d) are summarized in Table 4.　All conformance tests were successfully conducted in accordance with the Reference (e) with the exception of Sub-Test 6.0, Signaling Link Congestion. The traffic loading resources currently available at the JITC were unable to initiate enough call attempts to overload a signaling link or exceed congestion onset thresholds. The inability to verify STP and SPCS compliance with congestion control requirements should have no impact upon their deployment in the DISN.　One 56 Kbps signaling link has more than enough capacity to support the traffic normally routed between two DSN SPCSs.

Table 3. STP Interoperability Requirements/Status

Interface	Version	Requirement/Criteria	Critical Interface	Test Results	Operational Impact	Interface Status
Nortel Networks' MSL-100	MSL-15	Common channel Signaling Number 7 in accordance with GSCR Paragraph 6.5	Yes	Passed	None	Certified
Siemens EWSD	Version 18		Yes	Passed	None	Certified
Lucent 5ESS	5E15		Yes	Passed	None	Certified
Nortel Networks' BroadBand STP	3.0.3.18d	SS7 in accordance with GSCR Paragraph 6.5 and B-link connectivity in accordance with GSCR Paragraph 6.5.1.2.1.b	Yes	Passed	None	Certified
Tekelec Eagle STP	23.1		Yes	Passed	None	Certified
Prominia 400/800		56/65 Kbps Signaling Data Link transmission paths in accordance with GSCR Paragraph 6.5.2 and Bellcore LSSGR Section 6.5.2	Yes	Passed	None	Certied
Premisys IMACS /800	3.8.0		Yes	Passed	None	Certified
Access T-1500 CSU/DSU	087-161E-03C/087-062E-01C		Yes	Passed	None	Certified
SS7 Signaling Links		CCS7 (SS7) Signaling Link Connectivity in accordance with GSCR Para. 6.5.1.2.1	Yes	Passed	None	Certied
V.35 Signaling Link Interface		Signaling Data Link Physical Interface in accordance with GSCR Paragraph 6.5.2 and Bellcore LSSGR Section 6.5.2.1	Yes	Passed	None	Certied
DS-1 Signaling Link Interface			Yes	Passed	None	Certified
OCU-DP Sig. Link Interface			No	Passed	None	Certied
DS0A Sig. Link Interface			No	Not tested	None	Not Tested

Table 4. Nortel Networks' BroadBand STP and Tekelec Eagle STP Conformance Test Results

	STP Test Plan Title	GSCR Requirement Para(s)	Tested	Status
Sub-Test II-1 & II-7 SS7 Network Structure				
D-1 & D-7.1	**SS7 Network Structure**	6.5.1	Yes	Met
Sub-Test II-2 & II-7 Signaling Link Characteristics				
D-2.1 to 2.4 & D-7.2.1	Verification of SS7 Link Performance with Stored Program Control Switches	6.5.1, 6.5.2	Yes	Met
D-2.5 & D-2.7	Verification of LSSU Codes and Format	6.5.3, 6.5.4, 6.5.10	Yes	Met
D-2.6, 2.8, & D-7.2.2	Verification of Emergency Alignment	6.5.2, 6.5.4	Yes	Met
Sub-test II-3 & II-7 Signaling Message Handling Functions, Formats, and Codes				
D-3.1 & 3.2	Message Formats and Codes	6.5.10, 6.5.11	Yes	Met
D-3.3 & D-7.3.1	Message Handling	6.5.3	Yes	Met
D-3.4 & D-7.6	Signaling Connection Control Part (SCCP) Capabilities	6.5.5	Yes	Met
D-3.5 & D-7.3.2	Load Sharing	6.5.3.1	Yes	Met
Sub-test II-4 & II-7 Signaling Network Management				
D-4.1, 4.2, 7.4.1, 7.4.2	Signaling Link Management	6.5.4	Yes	Met
D-4.3, 4.4, & 7.4.3	Signaling Route Management	6.5.4	Yes	Met
D-4.5 & D-7.5	Gateway Screening	6.5.1.1	Yes	Met
Sub-Test II-5 Error Detection and Recovery				
D-5.1 & D-5.3	Basic Error Detection and Recovery	6.5.2.1	Yes	Met
D-5.2 & D-5.4	PCR Error Detection and Recovery	6.5.2.1	Yes	Met
Sub-test II-6 Signaling Link Congestion				
D-6.1 & 6.2	Signaling Link Congestion	6.5.4.2	No	Note 1

Note 1. See discussion in Paragraph 11.b above.